

$^{234,236}\text{U}$ Evaluations

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LANL, T-2

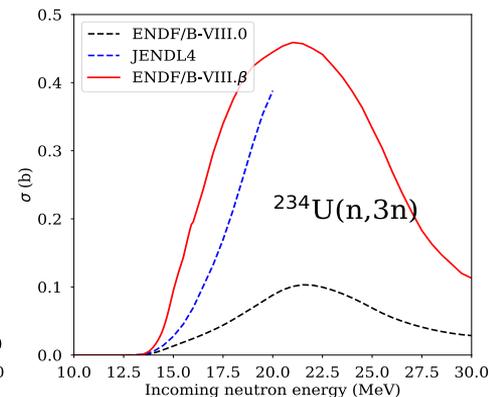
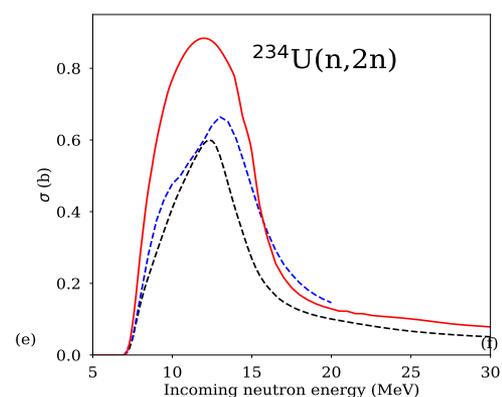
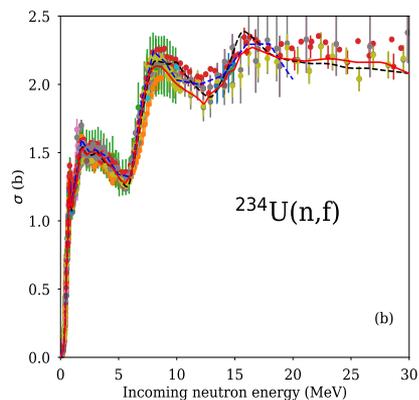
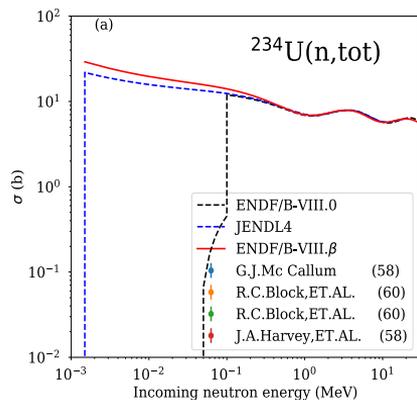
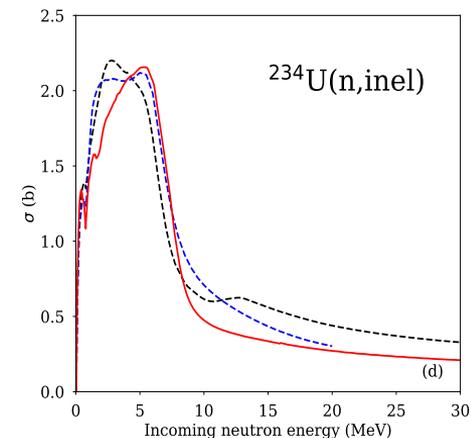
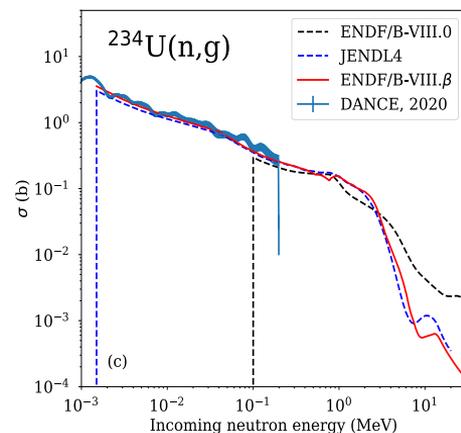
	^{234}U	9225	'5cd043d'	3360	0	48	LANL	-SEPT2	0 Stetcu, Lovell, Kawano, Herman
	^{235}U	9228	'cf9e1d2'	16804	0	124	IAEA	NOV17	IAEA CIELO Collaboration
	^{236}U	9231	'a0483da'	4088	0	12	LANL	SEPT20	Stetcu, Lovell, Kawano

Summary of changes from ENDF/B-VIII.0

- Cross sections for all open channels reevaluated based on CoH₃ calculations
- CoH₃ tweaked to reproduced the evaluated fission cross sections
 - ²³⁴U fission cross section re-evaluated to include Tovesson data
 - ²³⁶U fission cross section from ENDF/B-VIII.0 has been preserved
- LSSF flag has been set to 1, the URR parameters will be used for self shielding only, pointwise cross sections in file 3.
- Updated angular distributions
- Adopted the JENDL4.0 PFNS and its covariance for both ^{234,236}U
- Reevaluated the cross section covariances for all channels based on a Kalman filter
- Nubar is the same as in ENDF/B-VIII.0
- Some capture parameters calibrated for the ²³⁸U(n,g) reaction
- The goal for this evaluation did not include using consistent parameters for all U isotopes. A different study has been pursued with the goal of determining consistent parameters for all U isotope suite.

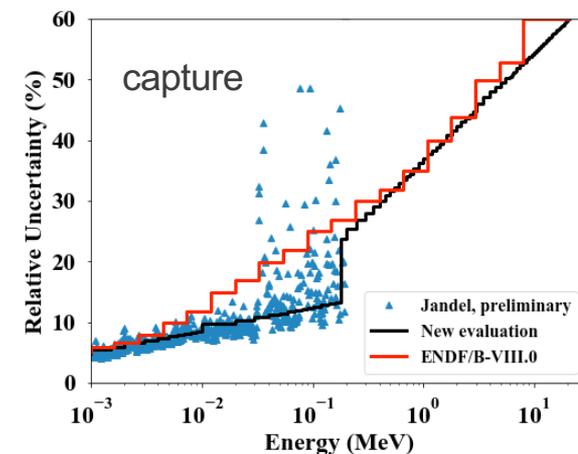
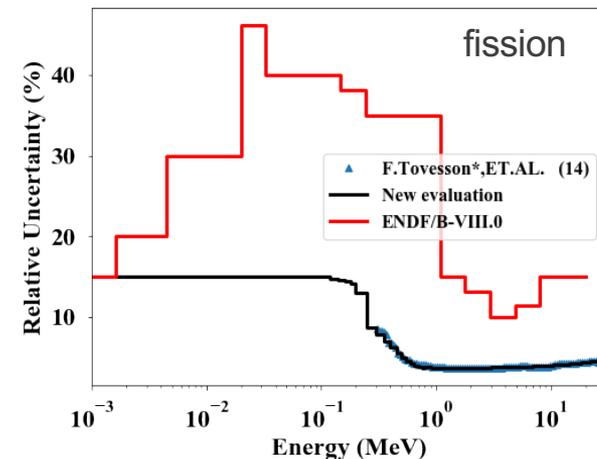
^{234}U

- The final analysis of the capture data is still not available
- Preliminary analysis shows that the capture resonance parameters need to be updated
- Significant changes in some channels with respect to ENDF/B-VIII.0
- No significant changes in the fission cross section



Uncertainties/Covariances for ^{234}U

- ❖ All correlations between the incident energies are taken from a Kalman filter calculation, based on experimental uncertainties/correlations and CoH_3 sensitivity calculations
- ❖ **Fission:** the shape of the uncertainties for the fission cross section are fit to Tovesson above 300 keV and are scaled to match the ENDF/B-VIII.0 uncertainties at 1 keV.
- ❖ **Capture:** The uncertainties are fit to the preliminary DANCE uncertainties below 200 keV using a log function. Above 200 keV, the uncertainties are fit, again to a log function, to reproduce the uncertainties in ENDF/B-VIII.0.
- ❖ **Total:** The shape of the uncertainties is kept from the Kalman filter calculation below 20 keV and above 20 keV, the magnitude is kept at the value of the relative uncertainty at 20 keV. The magnitude of the uncertainties from Kalman are scaled by a factor of two (around 4%).

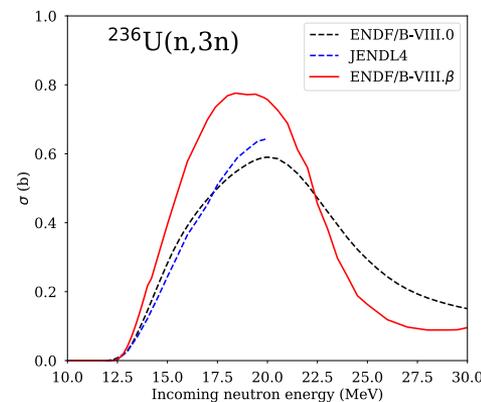
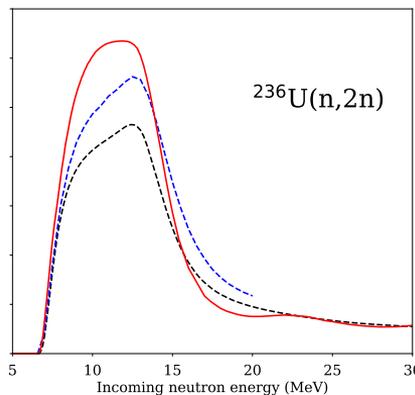
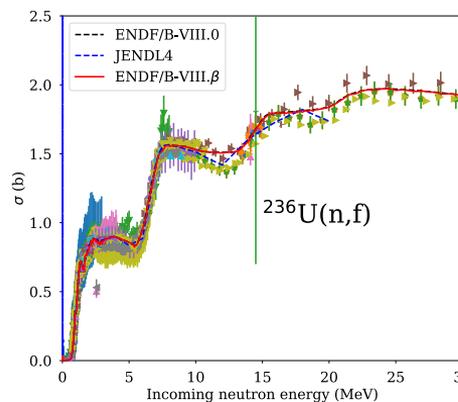
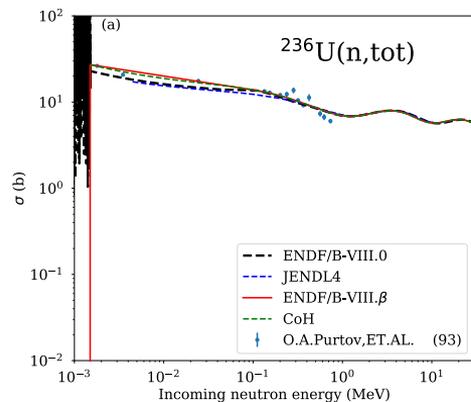
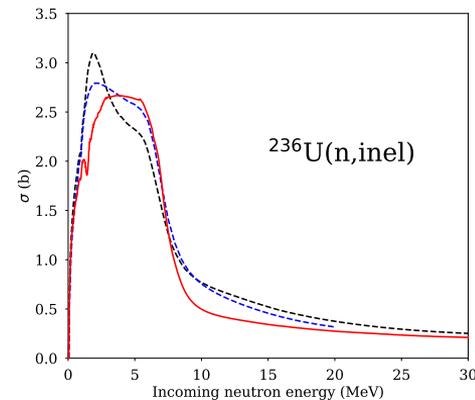
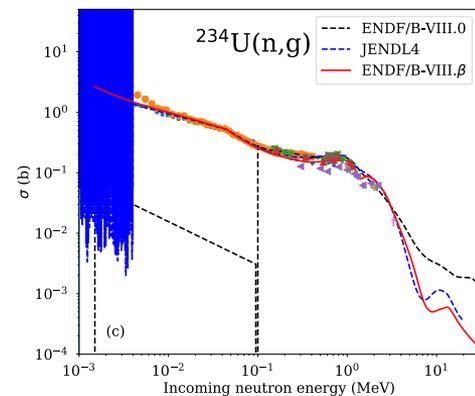


Uncertainties/Covariances for ^{234}U (cont)

- ❖ **Inelastic**: the shape of the uncertainties is kept from the Kalman filter calculation and the magnitude was adjusted so that the maximum uncertainty was approximately 30%, similar to the maximum in ENDF/B-VIII.0.
- ❖ **(n,2n)**: the shape of the uncertainties is kept from the Kalman filter calculation and the magnitude was adjusted so that the maximum value of the uncertainty was nearly the same as the uncertainty from ENDF/B-VIII.0 (~30%).
- ❖ **(n,3n)**: the shape of the uncertainties is kept from the Kalman filter calculation and the magnitude was adjusted so that the maximum value of the uncertainty was similar to the (n,2n) uncertainty (~30%).
- ❖ **Elastic**: derived from total and all other channels.
- ❖ **PFNS** covariances from JENDL.

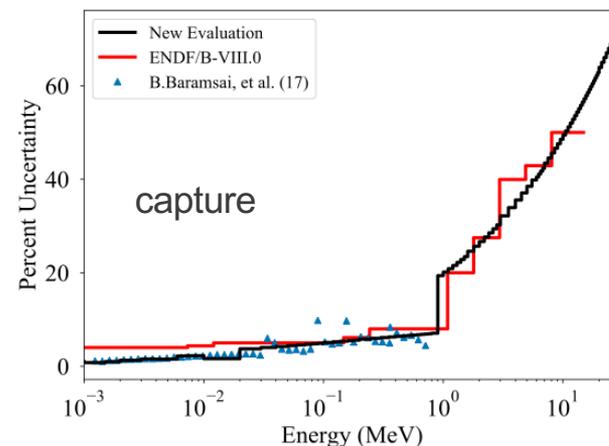
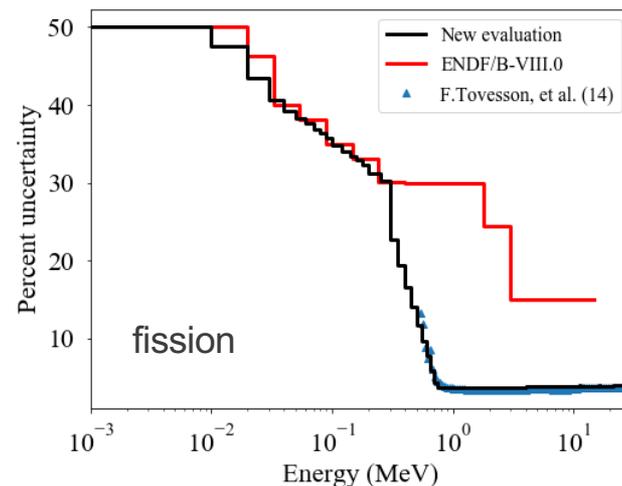
^{236}U

- ❑ The evaluation compares well against existing data, including DANCE
- ❑ Resonance parameters for $^{236}\text{U}(n,g)$ refitted to DANCE data, but only for the s wave and in different format than currently in ENDF
- ❑ Significant changes in some channels with respect to ENDF/B-VIII.0



Uncertainties/Covariances for ^{236}U

- ❖ All correlations between the incident energies are taken from a Kalman filter calculation, based on experimental uncertainties/correlations and CoH_3 sensitivity calculations
- ❖ **Fission:** The magnitude of the uncertainties for the fission cross section are fit to Tovesson above 800 keV and are fit to reproduce ENDF/B-VIII.0 below 300 keV. In the energy range between these two regions, the magnitude of the uncertainties linearly connects the two regions.
- ❖ **Capture:** The magnitude of the uncertainties are scaled to the uncertainties of Baramsai, et al. below 1 MeV and follow the shape and magnitude of the uncertainties from ENDF/B-VIII.0 above 1 MeV. Uncertainties are linearly increasing (fit to Baramsai) up to 1 MeV, and then follow a logarithmic function above 1 MeV.

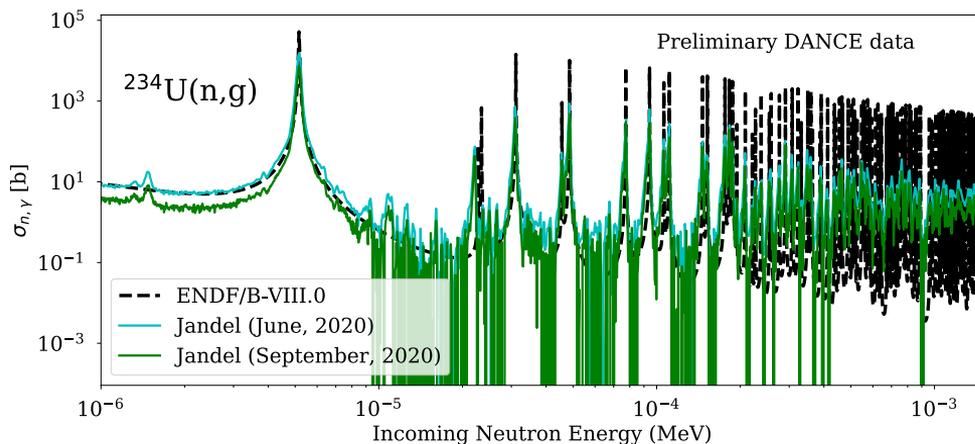


Uncertainties/Covariances for ^{234}U (cont)

- ❖ **Total:** We included dummy experimental data with 10% uncertainties taken from the fitted CoH calculation above 1 MeV. The shape of the uncertainties were kept from the Kalman filter calculation and the magnitude was doubled, to keep the uncertainties in the few percent range.
- ❖ **Inelastic:** the shape of the uncertainties is kept from the Kalman filter calculation and the magnitude was adjusted so that the maximum uncertainty was approximately 20%.
- ❖ **(n,2n):** The shape of the uncertainties was kept from the Kalman filter calculation and the magnitude was adjusted so that the maximum value of the uncertainty was nearly the same as the uncertainty from ENDF/B-VIII.0 (~17%).
- ❖ **(n,3n):** The shape of the uncertainties was kept from the Kalman filter calculation and the magnitude was adjusted so that the maximum value of the uncertainty was similar to the (n,2n) uncertainty (~17%).
- ❖ **Elastic:** derived from total and all other channels.
- ❖ **PFNS** covariances from JENDL

Summary

- ✓ New evaluation based on recent experimental data (capture) and model calculations (CoH)
- ✓ All channels updated (fission special)
- ✓ All cross section covariances/uncertainties updated
- Data analysis still in progress



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